

Rate Contract
Government of India
Directorate General of Supplies & Disposals
Jeewan Tara Building, 5-Sansad Marg
New Delhi- 110001
Tel. Number: - 011-23360610/23360537

Rate Contract No: - Solarlight/IT-2/RC-D3020000/1010/82/02528/778

Dated 01-DEC-09

To,
SAMTEK ELECTRONICS
Samtek Electronics
F-256, Pandav Nagar
Delhi- 110091

Delhi

Sub: Rate Contract for Supply of Solar Lighting System

Validity: From 10-NOV-09 To 31-OCT-10.

Ref: (1) This Office Tender Enquiry No:-Solarlight/IT-2/RC-D3020000/1010/82

Opened on 29-JUL-09

(2) Your Quotation No:- SOL-09/10 And Dated

Dear Sir,

You are hereby informed that your above referred tender read with subsequent letters mentioned above for the Stores specified in the Schedules annexed has been accepted. This rate contract will be governed by the terms and conditions brought in the Form No:- DGS&D1001 available from DGS&D sales counter on payment of Rs.50/-. The Rate Contract and the schedules annexed here to shall be the sole repository of this Rate Contract/Transaction.

SCHEDULES ANNEXED

1. Schedule "A" Description of stores, prices, duties/taxes.
2. Schedule "B" special conditions of contract/other information.
3. Schedule "C" Information to DDOs about parallel rate contracts.
4. Annexed – Technical Specification.

Your Faithfully

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Assistant Director (S) Section Officer/Dy. Director
For and on behalf of the purchaser named in the form DGS&D1001

1. The Chief Controller of Accounts. Department of commerce. New Delhi
COA Mumbai/ COA Kolkata, COA Chennai.
(Thought authentication cell) This issue with the approval of competent authority.
2. Deputy Director General of Supplies & Disposal Chennai -10 copies each.
3. Deputy Director General of Supplies & Disposal Kolkata -10 copies each.
4. Deputy Director General of Supplies & Disposal Mumbai -10 copies each.
5. Deputy Director General (QA), Kolkata -10 copies each.
6. Deputy Director General (QA), Chennai -10 copies each.
7. Deputy Director General (QA), Mumbai -10 copies each.
8. Deputy Director General (QA), DGS&D -10 copies each.
9. Inspection Authority ADG (QA) DGSD&D New Delhi- 110001
10. Quality assurance Officer Director (QA) Delhi Directorate/ Mumbai, Chennai, Kolkata.
11. Concurrent Audit.
12. MIS Cell
13. Ledger Clerk
14. O.L.Section
15. All Direct Demanding Officers as per mailing list maintained by DGS&D.

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Assistant Director (S)/ Section Officer/ Deputy Director
FOR DIRECTOR GENERAL OF SUPPLIES & DISPOSALS

SCHEDULE-A

1. Rate Contract No:-Solarlight/IT-2/RC.D-3020000/1010/82/02528/778
Dated 01-DEC-09 For the Supply of Solar Lighting System

2. Advance Rate Contract No:- Nil
Dated

3. (a) Name and Full Address of the Firm:-

SAMTEK ELECTRONICS
Samtek Electronics
F-256, Pandav Nagar
Delhi -110091
Tel.No—011-22799091
Fax :- 011-22799091
Email:- samtekwerelectronics@hotmail.com
info@samtekwere.com

(b) Name and Full Address of Manufacturer:-

SAMTEK ELECTRONICS
C-22/10, Sector-57, Gautam Budh Nagar, Noida (UP)

(c) Brand: SAMTEK

4. Validity of Rate Contact: 01-NOV-09 To 31-OCT-10

5. Description of Item, Specification, Unit, Rate

Item No	Model No	Store Description		Unit	Rate
6	SAMTEK	Solar Lantern (MNES Specification)	Model Number:-HA,CFL Lamp Rating:- 7W Battery Capacity:- 12V, 7.00 AH	NOS.	3288/-Rs. Three Thousand Two Hundred Eighty Eight Only.
7	SAMTEK	Solar Lantern (MNES Specification)	Model Number:- HB, CFL Lamp Rating:- 7W Battery Capacity:- 12V, 7.00 AH	NOS.	3654/-Rs. Three Thousand Six Hundred Fifty Four Only.
8	SAMTEK	Solar Home Light System With Structure (MNES Specification)	Model Number:- 1. No of CFL Lamps of 9 or 11W, Rating:- LCD Fan Rating :- Battery, Voltage and Capacity:- 12W, 20 AH	NOS.	7356/-Rs. Seven Thousand Three Hundred Fifty Six Only.

9	SAMTEK	Solar Home Light System With Structure (MNES Specification)	Model Number:- 2, No. of CFL Lamps of 9 or 11W, Rating:- 2, DC Fan Rating:- Battery, Voltage and Capacity:- 12V, 40 AH	NOS.	12500/-Rs. Twelve Thousand Five Hundred Only
10	SAMTEK	Solar Home Light System With Structure (MNES Specification)	Model Number:- 3, No of CFL Lamps of 9 or 11W, Rating:- LCD Fan Rating:-less then 20W, Battery, Voltage and Capacity:-12V, 40 AH	NOS.	12644/-Rs. Twelve Thousand Six Hundred Forty Four Only
11	SAMTEK	Solar Home Light System With Structure (MNES Specification)	Model Number:- 4, No. of CFL Lamps of 9 or 11W, Rating:- 2,DC Fan Rating:-less then 20W, Battery, Voltage and Capacity:-12V, 75 AH	NOS.	21937/-Rs. Twenty One Thousand Nine Hundred Thirty Seven Only.
12	SAMTEK	Solar Home Light System With Structure (MNES Specification)	Model Number:- 5, No of CFL Lamps of 9 or 11W, Rating:- 4, DC Fan Rating:-less then 20W, Battery, Voltage and Capacity:-12V, 75 AH	NOS.	22024/-Rs. Twenty Two Thousand Twenty Four Only.
13	SAMTEK	Solar Home Light System With Mounting Structure & Pole (MNES Specification)	Description of Item 1X 11W CFL, PV Module:- 74W Battery Capacity:- 12V, 75 AH	NOS.	24209/-Rs. Twenty Four Thousand Two Hundred Nine Only.
15	SAMTEK	Solar Home Light System With Mounting Structure & Pole (MNES Specification)	Description of Item:2X 11W CFL (Double Luminaire with 1 CFL each) PV Module:-20W, Battery Capacity:12V,100AH	NOS.	35096/-Rs. Thirty Five Thousand Ninety Six Only.

6	Terms of Delivery	Free Delivery at consignee's premises including installation
7	Excise Duty	Not Applicable
8	Sales Tax	CST/VAT Extra @4%
9	Delivery Period	4-12 weeks from the date of receipt of confirmed order
10	Annual Turnover/Monetary Limit	Without Limit
11	Payment Terms	As per Schedule B
12	Slab Discount Clause	Nil
13	Prices	NA
14	Quantity Offered	NA
15	Minimum Quantity in Single Supply Order	Rs.25000/-
16	Minimum order Value in Single Supply Order	Rs.25000/-
17	Status of the RC Holding Firm	SSI
18	Paying Authority	The Chief Controller of Accounts, Deptt. of Supply 16 A, AKBAR ROAD New Delhi-110011
19	Inspection Authority	For Civil and Defense ADG(QA) Jeewan Tara Building, Parliament Street New Delhi
20	Quality Assurance Officer	For Civil and Defense Director(QA), Delhi Directorate, Jeewan Tara Building, 4 th Floor , Sansad Marg New Delhi Delhi-110001
21	Place where the stores are to be Tendered for Inspection	At C-22/10, Sector -57, Gautam Budh Nagar, Noida(UP)
22	R/C is DDOs Operated	Yes

With effect from First October Two Thousand Eight (01-10-2008). All supply order(s) against this Rate Contract must be placed by Direct Demanding Officer(s) online through DGS&D website (www.dgsnd.gov.in) (indentor's page) only. Supply order (s) in any order form placed on or after 01-10-2008 shall not be valid and shall not be acted upon by the contractor or any other concerned agencies.

DDO shall download the supply order and send an ink signed copy to the concerned paying authority specified in the rate contract through Registered / speed post immediately after on-line placement of Supply Order(s).

23. Packing & Specification:

See Annexure

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Asstt. Director(S)/Section Officer/ Dy. Director
For and behalf of the purchaser named in the Firm DGS&D 1001

All the R/C particular including prices in respect of individual R/Cs are available on DGS&D website which can be accessed by all. The DGS&D website is <http://dgsnd.gov.in>

SCHEDULE-B

RC Specification: 1. Monetary Limit: Without Limit

2. GUARANTEE / WARRANTEE CLAUSE:

(a) Solar Lantern, Solar Home Lighting System, Solar Street Lighting System (incl. Battery) 24 month form the date of delivery/ installation, whichever is later.

(b) PV Module: 10 years (min.) from the date of delivery/ installation, whichever is later.

3. Payment Terms:-

(a) For Solar Lantern and Spare PV Module:98% against Inspection and delivery to the consignee and balance 2% after acceptance of stores by the consignee and submission of BG for the same amount valid for 2 years and 2 month form the date of acceptance of store by consignee.

(b) For Solar Home & Street Lighting System:90% against Inspection and delivery to the consignee and balance 10% after installation commissioning & final acceptance of stores by the consignee and submission of BG for the same amount valid for 2 years and 2 months form the date of acceptance of stores by the consignee.

4. Terms of Delivery: -

Stores will be delivered free at consignee's premises including freight, forwarding under DGS&D standard transit insurance clause. The purchaser will not pay separately for the insurance charges and it will be contractor's responsibility for the safe arrival of goods in full & good condition.

5. All the item shall be as per latest MNES specification and tenderer shall also be furnished to be concerned D(QA) at the time of inspection.

6. Octroi Duty & Local Taxes:-

Normally materials to be supplied to Government Department against Govt. Contracts are exempted form levy of town duty. Octroi duty, terminal tax and other levies of local bodies. The local Town Municipal Body regulations at times, however, provide for such exemption only on production of such exemption certificate from any authorized officer. Contractor should ensure that stores ordered against contracts placed by this office are exempted from levy of Town duty/ Octroi duty. Terminal tax or other local taxes and duties. Wherever, required, they should obtain the exemption certificate from the purchase officer or indentor concerned, to avoid payment of such local taxes or duties. Octroi, entry tax etc. on the buyer account in the absence of relevant exemption certificate.

7. Road permit, Waybill to be provided by DDO along with the order.

In all such cases where the requirement of Road Permit/ Way Bills for entry of goods into a particular States is mandatory, the following provision shall be strictly followed.

(a) The supplier shall request the indentor consignee for providing Road permit / Waybill with in 10 days of the receipt of the Supply order. The supplier shall furnished all the necessary information and documents in this regard to Indentor/ consignee.

(b) On receipt of the above request form the supplier, the indentor consignee concerned shall arrange to provide the Road Permit/Waybill in the prescribed from the supplier within a maximum period of two weeks so that the same reaches the supplier before the dispatch of the stores. However, in case where the Road permit, Way Bill is issued on proof actual invoice of the material, the consignee shall arrange to provide the Road permit /Way Bill from appropriate authorities within a maximum period of 5 days from the receipt of invoice.

(c) The supplier shall not be held responsible for any delay in supply due to non supply/delayed supply of Road permit/ way bill By the indentor/consignee.

(d) All cases of abnormal delay in providing requisite details document by the supplier or issue of Road permit/way bill by indentor/ consignee same shall be reported by them to DGS&D

The details of the Road permits presently applicable in different States are as under:-

Sr. No. States Road Permit,

- (1) Andhra Pradesh:-
- (2) Arunachal Pradesh: From DG-01
- (3) Assam: From 62
- (4) Bihar: From 28
- (5) Chattingarh: From 59A
- (6) Goa:-
- (7) Gujarat: From 403
- (8) Haryana: From 38 if value is 25,000 or more.
- (9) Himachal Pradesh:-
- (10) Jammu & Kashmir:-
- (11) Jharkhand: From 28B
- (12) Karnataka:-
- (13) Kerela:-
- (14) Madhya Pradesh: From 88/89
- (15) Maharashtra:-
- (16) Manipur: From 27
- (17) Meghalaya: From 14
- (18) Mizoram: From 33
- (19) Nagaland: From 16
- (20) Orissa: From 28
- (21) Punjab:-
- (22) Rajashthan: From 18
- (23) Sikkam: From 20
- (24) Tamil Nudu:-
- (25) Tripura: From 26
- (26) Uttar Pradesh: From 32
- (27) Uttaranchal: From 17
- (28) West Bengal: From 50

SPECIAL INSTRUCTIONS – TO RCHOLDERS

1. Rate Contract holders are advised that before entertaining the supply order(s) they should ensure the availability of following certificates From DDOs.
 - a) They are Central Government Department drawing fund from Consolidated Fund of India.
 - b) The expenditure involved for the purchase has received the sanction of the competent financial authority.
 - c) The funds are available under the proper head in the sanctioned budget allotment for the year.
 - d) The have been fully authorized by Department to sing the supply order and incur the liability in respect of the stores being ordered

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(RAJ SINGH)

Section officer

For and on behalf of the purchaser named in the from DGS&D-1001

ANNEXURE

1. Spare PV Module shall be supplied with appropriate cable, connectors and soldering terminals.
2. Solar lantern shall comprise of lead acid battery, PV module, battery box, compact fluorescent lamp and shall be complete with luminaire, control electronics, interconnecting cables/ wires and operating instruction/ maintenance manual.
3. Solar Home Lighting System shall comprise of lead acid battery, PV module, (where specified) and complete with luminaire, control electronics, interconnecting cables/ wires and operating instruction/ maintenance manual.
4. Solar Street Lighting System shall comprise of lead acid battery, PV module, pole, module mounting hardware, battery box, comprise fluorescent lamp and complete with luminaire, control electronics, interconnecting cables/ wires and operating instruction/ maintenance manual.
5. All the item shall be as per MNES specifications of 2006-2007 except solar lantern under Schedule 2 which shall be per MNES specifications of 2005-2006
 And tenderer shall possess satisfactory test certificate issued by Solar Energy Centre or any other approved testing centre of MNES and same shall also be furnished to the concerned D (QA) at the time of inspection.
 However, item No. 2 & 3, under schedule 4, shall generally conforming to MNES specification of 2006-2007 for all features, except for following:
 - (i) The battery will have a minimum rating of 12V, 100 AH at c/10 discharge rate.
 - (ii) The power out put of the module (s) under STC should be a minimum of 120 w.
6. Thickness of Battery Box for Home Light System and Street Lighting System shall be minimum 0.70 MM made up of MS sheet or minimum 2.25 mm made of injection Moulded Polymer.
7. For Street Lighting System, mounting hardware shall be adjustable for sun orientation. The pole shall be either in one piece with uniform diameter of 76 mm OD or swaged type with 76mm OD in lower portion and 60 mm OD in upper portion or 76 mm OD throughout, made up of MS duly primered (2 coats) and painted in silver ash hammer tone colour (or as chosen by DDO). The pole shall have suitable arrangement for grouting and length of the pole above ground shall not be less than 4.0 meters.
8. PV Modules manufacturer should be MNES approved.
9. They shall have a test ting facility to check the power out put of PV module, calibrated modules t up for measuring sun intensity, voltmeter, ammeter, D.C power supplies, multimeter, loading facility for charge controller, H.V & I. R tester etc.
10. The Battery shall be of standard makes of Panasonic, Exide Base, Yuasa, Prestolite, HBL nife, Amarraja, Hitachi, CSB, Kamatsu, Okaya or DGS&D registered battery. Suppliers are at liberty to also use their label/logo/monograph for easy identification, in addition to the make of manufacturer.
11. CFL Lamps shall be of standard marks of Osram, Philips, Bajaj, Phonix, Havells, Anchor, Surya or DGS&D registered make.

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**SPECIFICATION FOR SOLAR PHOTOVOLTAIC SYSTEM
(MNES 2005-2006 SPV PROGRAMME)**

SOLAR LANTERN

1. Definition:

A Solar Photovoltaic Lantern is a lighting system consisting of metal, plastic or fiber glass and a PV module. The Battery is charged by electricity generated through the PV module. The Lantern is basically a portable lighting device suitable for indoor lighting covering a full range of 360 degrees. A lighting device which provides only unidirectional lighting will not be classified as a solar lantern in the present context.

2. Duty Cycle:

The solar lantern should provide a minimum of three hours of lighting per day under average daily Solar radiation conditions of 5 KWH/ sq . m. on a horizontal surface. The actual duration of lighting may vary Depending on the location, season, etc.

3. Models:

The solar lantern should conform to one of following 12V models.

(a) Model I IA

Lamp.....CFL 7w,
Battery Capacity At C/20 Rate.....12V, 7.00AH,
PV Module Rating10.0 To 11.9wp,

(b) Model I IB

Lamp.....CFL 7w,
Battery Capacity At C/20 Rate.....12V, 7.00AH,
PV Module Rating10.0 To 11.9wp,

4. Lamp:

- (a) The lamp be of compact (CFL) type with a rating of 7w.
- (b) For 4-pins type CFLs, a suitable pre-heating circuit must be provided
- (c) The lamp should preferably be mounted in a base up configuration.
- (d) The light output should be 370/-5% lumen for a 7w lamp (see also of 6.)

5. Battery:

- (a) The battery will be sealed maintenance free lead acid type.
- (b) The capacity of the battery will be a minimum of 7.0AH at 12 V at C/20 discharge rate at 20C.
- (c) Eighty percent of the rated battery capacity should be between the low voltage and high voltage cut/ points.

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6. Electronics:

- (a) The inverter will be of quasi wave/sine wave type with a crest factor less than 1.7 and the frequency in the range of 20-35 KHz. Half-wave operation is not acceptable.
- (b) The overall efficiency of the control electronics should be at least 80%.
- (c) No blacking or reduction in the lumen output by more than 10% should be observed after 1000 ON/OFF cycles (Two minutes on and four minutes off is not acceptable).
- (d) The idle current (I. e. the current consumed when the lamp is switched OFF and no charging is in progress) should not be more than 1mA.
- (e) The PCB containing the electronics should be capable of solder free installation and placement.
- (f) Electronics should operate at 12 V and should have temperature compensation for proper of battery through out the year.

7. PV Module:

- (a) The wattage range of the PV modules will be 10.0-11.9 Wp for Module I IA & 12.0-.14.0 Wp For Module HB & it should be at 16.40. Volts for both the Models of (under standing test Conditions (STC). The open circuit voltage of the PV modules under STC should be at least 21.0 Volts for all 12 V Models.
- (b) The module should preferable have an arrangement (stand) for mounting at the optimum angle In the direction facing the sun.
- (c) In case of thin film solar cell modules, the specified values refer to the power output the After the initial degradation.
- (d) The terminal box on the module should have a provision inside for replacing the box cable if required.
- (e) A strip containing the following details be laminated inside the module so as to clearly visible From the front side:
 - (i) Name of the Manufacture or distinctive Logo.
 - (ii) Model or type No.
 - (iii) Serial No.
 - (iv) Year of make.

8. Electronic protection:

- (a) Adequate protection is be incorporated under no load conditions (e . g. when the lamp is Removed and the learn is switched ON).
- (b) Battery cut offs & reconnection should be provided to protect it against overcharge and deep Discharge conditions.
- (c) A fuse should be provided to protect against short circuit conditions.
- (d) A booking diode, preferably a Schottky diode should be provided as part of the lantern electronics to prevent reverse flow of current through the PV module in case such a diode is not provided with module its self.
- (e) Full protection against open circuit,

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9. Other features:

- (a) The lantern should be provided with 2 LED indicators, a green light to indicate charging in progress and a red LED to indicate charging in progress and a red LED to indicate deep discharge condition of the battery. The green LED should glow when the battery is actually being charged.
- (b) A good reliable switch suitable for DC use is to be provided on the lantern. A cable at least 5 meters long should be provided for interconnection between the module and the lantern.
- (c) The following details should be marked indelibly on the lantern:-
 - (I) Name of the Manufacturer or Distinctive logo.
 - (II) Model Number (this refers to models indicated below.)
 - (III) Serial Number.
- (d) An Operation, instruction and Maintenance Manual in English and the Local language should be provided with the solar lantern.
 The following minimum details must be provided in the Manual:
 - (I) About Photovoltaics.
 - (II) About solar lantern.
 - (III) About PV module.
 - (IV) About CFL.
 - (V) About battery.
 - (VI) Clear instructions about mounting of PV module.
 - (VII) About electronics.
 - (VIII) About charging and significance of indication.
 - (IX) DO's and DONT's.
 - (X) Clear instructions on regular maintenance and trouble shooting of the lantern.
 - (XI) Name and address of the person or Service Center to be contacted in case of failure or complaint.
- (e) Components and parts used I the solar lantern should conform to the latest BIS specifications, wherever such specifications are available and applicable.
- (f) The PV module will be warranted for a minimum period of 10 years from the date of supply and the lantern (including the battery) will be warranted for a minimum period of two years from the date of supply. The Warranty Card to be supplied with the system must contain the detail of the system supplied, as given in ANNEXURE "A". The manufacturer can also provide additional information about the system and conditions of warranty as necessary.
- (g) Additional features such as small white LED which function as a night lamp or a socket for powering another appliance such as a or radio may be provided in the lantern. These are however purely optional. If such features are provided, they should not interfere with the independent switching on and off of the lantern.

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**SPECIFICATION FOR SOLAR PHOTOVOLTAIC SYSTEM
(MNES 2006-2007 SPV PROGRAMME)
SOLAR HOME LIGHT SYSTEM**

1. Definition:

A solar home system aims at providing solar electricity for operating lights and / or fan or energizing a DC operated portable TV set for specified hours of operation per day.

2. Models:

(a) Module 1 (1 light Point)

PV Module ----- 1 X 18Wp under STC
 Lamp -----1 X CFL (9W or 11W)
 Battery -----1 X 12V, 20AH Tubular Plate low maintenance type lead acid battery
 Other Components ----- Control electronics, module mounting hardware, battery box, inter connecting wire/cables, switches operation instruction and maintenance manual

(b) Module 2 (2 Lights)

PV Module ----- 1 X 37Wp under STC
 Lamp -----2 X CFL (9W or 11W)
 Battery -----1 X 12V, 40AH Tubular Plate low maintenance type lead acid battery
 Other Components ----- Control electronics, module mounting hardware, battery box, inter connecting wire/cables, switches operation instruction and maintenance manual

(c) Module 3 (1 Light and 1 Fan)

PV Module ----- 1 X 37Wp under STC
 Lamp -----1 X CFL (9W or 11W)
 Fan ----- 1 X DC Fan (with waltage less than 20W)
 Battery -----1 X 12V, 40AH Tubular Plate low maintenance type lead acid battery
 Other Components ----- Control electronics, module mounting hardware, battery box, inter connecting wire/cables, switches operation instruction and maintenance manual

(d) Module 4 (2 Lights and 1 Fan)

PV Module ----- 2 X 37Wp or 1 X 74Wp under STC
 Lamp -----2 X CFL (9W or 11W)
 Fan ----- 1 X DC Fan (with waltage less than 20W)
 Battery -----1 X 12V, 75AH Tubular Plate low maintenance type lead acid battery
 Other Components ----- Control electronics, module mounting hardware, battery box, inter connecting wire/cables, switches operation instruction and maintenance manual

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(e) Module 5 (4 Lights)

- PV Module ----- 2 X 37Wp or 1 X 74Wp under STC
- Lamp -----4 X CFL (9W or 11W)
- Battery -----1 X 12V, 75AH Tubular Plate low maintenance type lead acid battery
- Other Components ----- Control electronics, module mounting hardware, battery box, inter connecting wire/cables, switches operation instruction and maintenance manual

Note:

- (a) All models will have a socket to provide power for a 12V DC TV set which is purchased separately.
- (b) A small white LED may be provided as an optional feature with an independent switch.

3. **Duty Cycle:**

Model	Average Hours of Operation/Day
Model 1	1 Light, 3-4 Hours
Model 2	2 Lights, 3-4 Hours
Model 3	1 Light, 1-2 Hours, 1 Fan- 1-2 Hours
Model 4	2 Lights, 2-3 Hours, 1 Fan- 2-3 Hours
Model 5	4 Lights, 3-4 Hours

4. **Lamp:**

- (a) The lamps will be of compact fluorescent (CFL) type, either 4-Pin or 2-Pin types with rating of 11W, for the 4- Pin type CFLs a suitable preheating circuit must be provided.
- (b) The light output from the lamps should be around 600+/- 5% lumens (for 9W CFL) 900+/- 5% lumens (for 11W CFL). Also please see (c) of 6 below.
- (c) The lamps should be housed in an assembly suitable for indoor use, with a reflector on its back. While fixing the assembly, the lamp should be held in abase up configuration.

5. **Battery:**

- (a) The battery will be of flooded electrolyte type, positive tubular plate low maintenance lead acid battery.
- (b) The battery will have a minimum rating of 12V, 20 or 40 or 75 AH at C/10 discharge rate depending on model.
- (c) 75% of the rated capacity of the battery should be between fully charged & load cut off conditions.

6. **Electronics:**

- (a) The inverter should be of quasi sine or full sine wave type with frequency in the range of 20-35 KHz. Half wave operation is not acceptable.
- (b) The total electronics efficiency should be at latest 80%.
- (c) No blackening or reduction in the lumen out put by more than 10% should be observed after 1000 ON/OFF cycles (2 min. ON followed by 4 min. OFF is one cycle.)
- (d) The idle current consumption should not be more than 10 mA.
- (e) Electronics should operate at 12V and should have temperature compensation for proper charging of the battery though out the year.
- (f) Necessary lengths of wires/cables, switches suitable for DC use and fuses should be provided.

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7. PV Module (s):

- (a) The PV module (s) shall contain crystalline silicon solar cells.
- (b) The power output of the module (s) under STC should be a minimum of 18W or 37W or 74W. In case of Model 4&5 either two modules of minimum 60W output. Each or one module of minimum 120W should be used.
- (c) The operating voltage corresponding to the power output mentioned above should be 16.4V.
- (d) The open circuit voltage of the PV modules under STC should be at latest 21.0 voltage.
- (e) The terminal box on the module should have a provision for opening for replacing the cable, if required.
- (f) A strip containing the following detail should be laminated inside the module so as to be clearly visible from the front side:
 - (i) Name of the Manufacturer or distinctive Logo.
 - (ii) Model or Type Number.
 - (iii) Serial Number.
 - (iv) Year of Make.

8. DC Fan:

The wattage of the fan should not be more than 20 Watts and it should operate at 12V DC.

9. Electronics Protections:

- (a) Adequate protection is to be incorporated under no load condition e.g. when the lamps are removed and the system is switches On.
- (b) The system should have protection against battery overcharge and deep discharge conditions.
- (c) Fuses should be provided to protect against short circuits condition.
- (d) A blocking diode should be provided as a part of the electronics to prevent reverse flow of current throughout the PV module (s) in case such diode is not provided with the solar module (s).
- (e) Full protection against open circuit accidental short circuit and reverse polarity should be provided.

10. Mechanical Component:

- (a) Metallic frame structure (with corrosion resistance paint) to be fixed on the roof of the house to hold the SPV module (s). The frame structure should have provision to adjust its angle of inclination to the horizontal between 0 and 45, so that it can be installed at the specified tilt angle.
- (b) A vented metallic box with acid proof and corrosion resistance paint for housing the storage battery indoors should be provided. The box can be of injection moulded polymer.

11. Other Features:

- (a) The system should be provided with 2 LED indicators, a green light to indicate charging in progress and a red LED to indicate deep discharge condition of the battery. The green LED should glow only when the battery is actually being charged.
- (b) There will be a Name Plate on the system which will give:
 - (i) Name of the Manufacturer and Distinctive Logo.
 - (ii) Serial Number.
- (c) Components and parts used in solar home systems should conform to the latest BIS specification, wherever such specifications are available and applicable.
- (d) The PV Module (s) will be warranted for a minimum period of 10 years from the date of supply and the solar home system (including the battery) will be warranted for a period of 2 years from the date of supply. The Warranty Card to be supplied with the system must contain the detail of the system supplied, as give in the ANNEXURE "A". The Manufacturers can also provide additional information about the system and conditions of warranty as necessary.
- (e) An operation, Instructions and Maintenance Manual in English and the local language should be provided with the solar home system:
The following minimum details must be provided in the Manual:
 - (i) About Photovoltaics.
 - (ii) About solar home system- its components and expected performance.
 - (iii) About PV module.
 - (iv) About CFL.
 - (v) About battery.

- (vi) Clear instructions on regular maintenance about mounting of PV module (s).
- (vii) About electronics.
- (viii) About charging and significance of indicators.
- (ix) DO's and DONT's.
- (x) Clear instructions on regular maintenance and trouble shooting of solar home system.
- (xi) Name and address of the person or service centre to be contacted incase of components.

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**SPECIFICATION FOR SOLAR PHOTOVOLTAIC SYSTEM
(MNES 2006-2007 SPV PROGRAMME)
SOLAR STREET LIGHTING SYSTEM**

1. Definition:

A stand alone solar photovoltaic street lighting system comprises a compact fluorescent lamp lead acid battery, PV module (s), control electronics, inter-connecting wires/cables, module mounting hardware, Battery box, Operation instruction and maintenance manual.

2. Duty Cycle:

The system should be designed to automatically switch ON at dusk, operate throughout the night and automatically switch OFF at the dawn, under average daily insolation of 5 KWH/sq. m. on a horizontal surface.

3. Lamp:

- (a) The lamp will be of compact fluorescent (CFL) type, either 4-Pin or 2-Pin type, with a rating of 11W, for the 4-Pin CFL, adequate pre-heating circuit must be provided.
- (b) The light output from the lamp should be around 900+/- 5% lumens, also please see(s) of five given below.
- (c) The lamp should be housed in a weather proof assembly suitable for outdoor use with the reflector on its back, while fixing the assembly, the lamp should be held in a base up configuration.

4. Battery:

- (a) Flooded electrolyte type positive tubular plate low maintenance lead acid battery.
- (b) The battery will have minimum rating of 12V, 75AH (at C/10) discharge rate. However for item no. 2 & 3 of schedule-4, the battery will have a minimum rating of 12V, 100AH (at C/10) discharge rate.
- (c) 75% of the rated capacity of the battery should be between fully charged & load cut off conditions.

5. Electronics:

- (a) The inverter should be of quasi sine wave or full sine wave type with frequency in the range of 20-35 KHz. Half wave operation is not acceptable.
- (b) The total electronic efficiency should be at least 80%.
- (c) No blackening or reduction in the lumen output by more than 10% should be observed after 1000 ON/OFF cycles (2min. ON followed by 4min. OFF is one cycle).
- (d) The idle current consumption should not be more than 10 mA.
- (e) Electronics should operate at 12V and should have temperature compensation for proper charging of the battery through out of year.
- (f) Necessary length of wires, cables and fuses should be provided.
- (g) The PV module will be used to sense the ambient light level for switching ON and OFF the lamp.

6. PV Module (s):

- (a) The PV module (s) shall contain crystalline silicon solar cells.
- (b) The power output of the module (s) under STC should be a minimum of 74W. Either two modules of minimum 37W output each or one module of 74W output should be used. However, for item 2 & 3 either two module of minimum 60W output each or one module of minimum 120W should be used.
- (c) The operating voltage corresponding to the power output mentioned above should be 16.4V.
- (d) The open circuit voltage of the PV module under STC should be at least 21.0 volts.
- (e) The terminal box on the module should have a provision for opening for replacing the cable, if required.
- (f) A strip containing the following details should be laminated inside the module so as to be clearly visible from the front side.
 - (i) Name of the Manufacturer or Distinctive Logo.
 - (ii) Model or type no.
 - (iii) Serial No.
 - (iv) Year of make.

7. Electronics Protections:

- (a) Adequate protection is to be incorporated under no load conditions e.g. when the lamp is removed and the system is switch ON.
- (b) The system should have protection against battery overcharge and deep discharge conditions.
- (c) Fuses should be provided to protect against battery overcharge and deep discharge conditions.
- (d) A blocking diode should be provided as a part of the electronics to prevent reverse flow of current throughout the PV module (s), in case such diode is not provided with the solar module (s).
- (e) Full protection against open circuit accidental short circuit and reverse polarity should be provided.

8. Mechanical Hardware:

- (a) A metallic frame structure (with corrosion resistance paint) to be fixed on the pole to hold the SPV module (s). The frame structure should have provision to adjust its angle of inclination to the horizontal between 0 and 45 so that the module (s) can be oriented at the specified tilt angle.
- (b) The pole should be made of mild steel pipe with a height of 4 meters above the ground level, after grouting and final installation. The pole should have the provision to hold the weather proof lamp housing. It should be painted with a corrosion resistant paint.
- (c) A vented acid proof and corrosion resistant painted metallic box for outdoor use should be provided for housing the battery.

9. Other Features:

- (a) The system should be provided with 2 LED indicators, a green light to indicate charging in progress and a red LED to indicate deep discharge condition of the battery. The green LED should glow only when the battery is actually being charged.
- (b) There will be a Name Plate on the system which will give:
 - (i) Name of the Manufacturer or Distinctive Logo.
 - (ii) Serial Number.
- (c) Components and part used in the solar street lighting system should conform to the latest BIS specification. Wherever such specification are available and applicable.
- (d) The PV module (s) will be warranted for a minimum period 10 years from the date of supply and the street light system (including the battery) will be warranted for a period 2 years from the date of supply. The warranty Card to be supplied with the system must contain the details of the system supplied as give in the ANNEXURE "A". The Manufacturers can also provide additional information about the system and condition of warranty as necessary.
- (e) An Operation, Instruction and Maintenance Manual, in English and the local language should be provided with the solar street lighting system:

The following minimum details must be provided in the Manual:

- (i) About Photovoltaic.
- (ii) About solar street lighting system its components and expected performance.
- (iii) About PV module.
- (iv) About CFL.
- (v) About battery.
- (vi) Clear instruction about erection of pole and mounting of PV module and lamp housing assembly on the pole.
- (vii) About electronics.
- (viii) About charging and significance of indicators.
- (ix) DO's and DONT's.
- (x) Clear instruction on regular maintenance and trouble shooting of the solar street lighting system.
- (xi) Name and address of the contact person in case of non functionality of the solar street lighting system.

ANNEXURE "A"

FORMAT FOR WARRANTY CARD TO BE SUPPLIED WITH EACH SOLAR LANTER, SOLAR HOME SYSTEM & STREET LIGHT SYSTEM

1. Name & Address of the Manufacturer/Suppler of the system.
2. Name & Address of the Purchasing Agencies.
3. Date of supply of the system.
4. Details of PV Module(s) supplied in the system:
 - (i) Make (Name of the manufacturer).
 - (ii) Model.
 - (iii) Serial Number.
 - (iv) Warranty of the PV module (s) under STC.
 - (v) Warranty valid upto.
5. Details of Battery:
 - (i) Make (Name of the Manufacturer).
 - (ii) Model.
 - (iii) Batch/ Serial Number.
 - (iv) Rated V & AH capacity at C/20/C10 rate at 20C.
 - (v) Warranty valid upto.
6. Details of electronics & other BOS items.
 - (i) Make (Name of the manufacturer).
 - (ii) Model.
 - (iii) Serial Number.
 - (iv) Warranty valid upto.
7. Designation & Address of the person to be contacted for claiming Warranty obligations.

(Signature)

Name & Designation
Name & Address of Manufacturer/Supplier
(SEAL)

Place & Date

(During the warranty period MNES/State Agencies/ user reserve the right to cross check the performance of the system with the minimum performance levels specified in the MNES specifications).

Solar Lantern (MNES Specification)

As per General Technical Requirements.

Solar Home Light System With Structure (MNES Specification)

As per General Technical Requirements.

Solar Street Light System With Mounting Structure & Pole (MNES Specification)

As per General Technical Requirements.

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